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ABSTRACT

Designed to assist the instructor in presenting curriculum content based upon industry and technology, this manual presents a program description and the instructional objectives for the industrial arts program in the Department of Defense Dependents Schools (DoDDS). Six sections are included in the manual: Industrial Arts Program Objectives, Middle Grades (6-8): Industrial Arts Program Objectives, High School (9-12): Orgnaizational Pattern for Industrial Arts in DoDDS: General Industrial Arts Laboratory, Middle Grades (6-8): General Industrial Arts Laboratory, High School Grades (9-12): and Mechanical Drawing Laboratory, High School Grades (9-12). Appended to the manual is a list of approved textbooks/instructional materials for industrial arts, grades 6-12. Materials listed for grades 6-8 are included in three areas: survey of industry, survey of construction, and survey of manufacturing. Materials listed for grades 9-12 are divided into six areas: Materials, process, and products of industry: applications of industrial methods: industrial technology: technical graphics: architectural design: and industrial design. (LRA)

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DS MANUAL 2890.1
NOVEMBER, 1978
INDUSTRIAL ARTS
OBJECTIVES
GRADES 6-12

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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FOREWORD

Industrial arts in the Department of Defense Dependents Schools (DoDDS) is a discipline which provides opportunities for all students from middle school through high school. The program and instructional objectives in this manual apply to grades 6 through 12.

Industrial arts is one of the creative arts that is essential to any complete educational program. Through industrial arts the students will acquire industrial-technical knowledge and skills by undergoing problem-solving and creative learning experiences involving such activities as designing, experimenting, planning, constructing and using tools, machines, materials and processes.

This manual has been prepared to assist the industrial arts instructor in presenting curriculum content based upon industry and technology.

Anthony Cardinale

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SEP 2 1980

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The objectives in this manual evolved from the efforts of many DoDDS educators.

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INDUSTRIAL ARTS PROGRAM OBJECTIVES
MIDDLE GRADES (6-8)

Industrial arts courses in the middle grades will give consideration to the nature of the early adolescent student. Early adolescence is a critical time in human development. During this time the student is seeking independence, sensitive to peer acceptance, establishing the value system, expanding his intellectual ability and experiences, and aware of his physical body changes. The first level courses in industrial arts in the middle grades will provide ORIENTATION to the adult world of work, industrial occupations, economics, and one's self. The second level courses should make available the EXPLORATION by students of broad areas of industry, usually categorized as manufacturing, graphic communications, power and transportation, and construction. Special concerns of the industrial arts courses in these grades are the common learnings needed by all persons to function effectively in our industrial-technological society--attitudes, interests, abilities and skills, problem solving, and understanding the world of work.

As a result of the sequence of industrial arts experiences in the middle grades, the learner should be able to:

1. Demonstrate industrial literacy--insights and knowledge--in being able to relate societal and industrial changes to technology and its development.

2. Make tentative choices or selections regarding educational goals.

3. Identify and compare industrial and technical occupations, the organization of industry, evolving technologies, and methods of production.

4. Demonstrate the correct and skillful use of basic tools and materials.

5. Apply industrial processes and techniques in his/her laboratory experiences and projects, such as mass production, personnel organization, material forming processes, and the use of synthetic materials and finishes.

6. Apply scientific, mathematical, and mechanical principles through projects or the solution of practical problems.

7. Solve problems by planning and constructing projects involving group and individual research, experimentation, and development.

8. Demonstrate safe practices in the laboratory and relate these to situations in the school, home, and community.

9. Practice skills to be used for discretionary-time (leisure-time) activities.

INDUSTRIAL ARTS PROGRAM OBJECTIVES
HIGH SCHOOL GRADES (9-12)

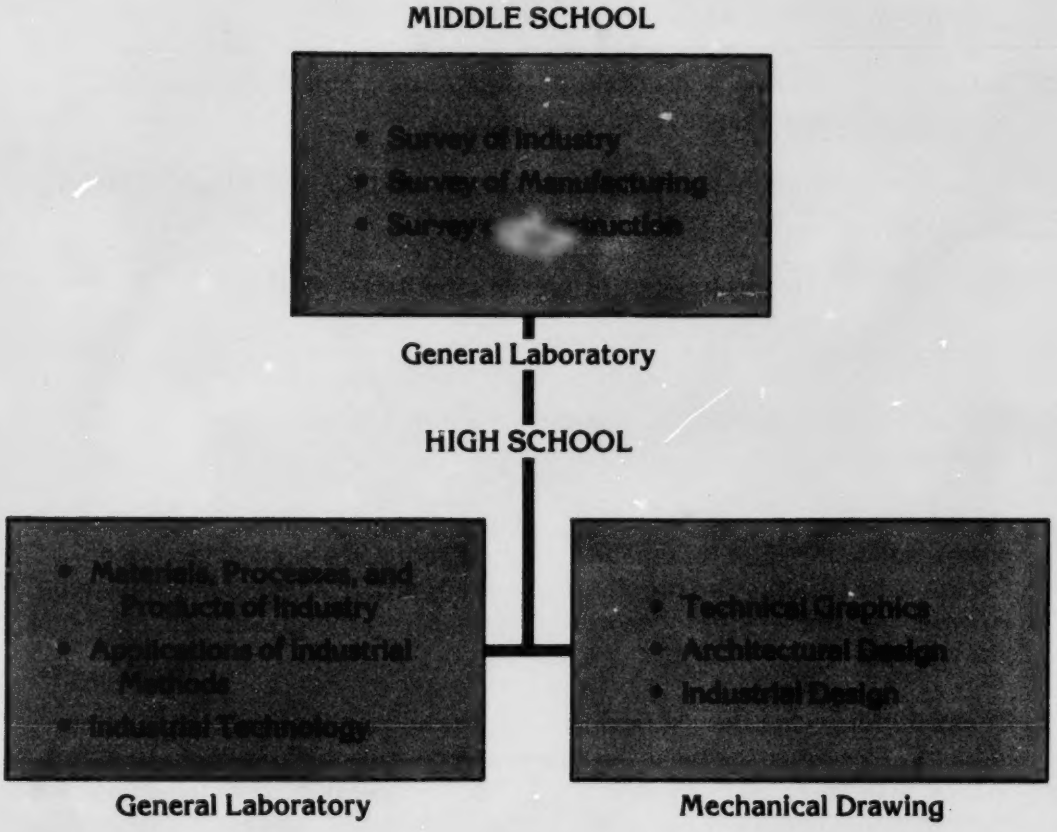
In the high school grades, industrial arts education provides a concentrated and specialized study of PRETECHNICAL courses. Because students in these grades now evince a wide range of interests, abilities, and life goals, the industrial arts program must provide separate courses or instruction within courses which may be prevocational for some, pretechnical for others, and preprofessional for still others. In these courses of technical orientation, not all students should study the same depth or type of content. Courses and content should be individually selected for those who may leave school before graduation, graduate, or enroll in a post-secondary program.

As a result of industrial arts experiences in the upper grades, the learner should be able to:

1. Display new insights and understanding of his/her material culture and its tools and technical equipment.
2. Identify and compare industrial-technical occupation, the organization of industry, technological changes, and methods of production.
3. Plan his/her economic future with consideration of the ever changing industrial society.
4. Demonstrate correct, skillful, and safe use of powered equipment and machines.
5. Apply scientific and mechanical principles through projects, experiments, or solutions of practical problems.
6. Apply industrial processes and techniques through laboratory experiences and projects such as mass production, personnel organization, special fabricating processes, and industrial materials.
7. Demonstrate orderly procedure for construction activities and problem-solving experiences including step-by-step analysis, organization of materials, appropriate time limits, and the self-evaluation of the task or product when completed.
8. Evaluate manufactured and constructed projects as judged by the quality of construction, appropriateness of materials, functionality of design, and utility of purpose.
9. Practice skills to be used in discretionary-time (leisure-time) activities.

ORGANIZATIONAL PATTERN FOR INDUSTRIAL ARTS IN DoDDS

The unique functions and objectives noted for industrial arts is best achieved in DoDDS by an organization composed of three laboratory courses in the middle school and six courses at the high school level; three general laboratory and three mechanical drawing courses. The organization is represented as follows:



It is recommended that every DoDDS student, by the time that they have completed 8th grade, will have had a minimum of 1 semester of industrial arts to effectively help them to select courses wisely in grades 9 through 12.

GENERAL INDUSTRIAL ARTS LABORATORY INSTRUCTIONAL OBJECTIVES FOR MIDDLE GRADES (6-8)

1. **Safety** — demonstrate safety practices.
2. **Design** — designs individual and group projects.
3. **Planning** — plans individual and group projects.
4. **Cooperative Group Action** — participates cooperatively in group activities.
5. **Occupational Information** — identifies various industrial occupations.
6. **Industrial Information** — describes the organization and evolution of industry, methods of production, and impact on society.
7. **Individual Craftsmanship** — demonstrates the skillful use of basic tools and materials.
8. **Marketing** — explains basic principles of sales and distribution.
9. **Finance** — explains how businesses and industries finance their operations.
10. **Maintenance and Service** — maintains and services tools, machines, and equipment.
11. **Manufacturing** — describes basic concepts of management, personnel, and production techniques for creating finished goods in a plant or factory. Explains the benefits and problems of custom-produced goods as opposed to an organized manufacturing system that efficiently integrates men, machines, and materials.
12. **Construction** — applies the basic knowledge and skills of the construction industry. Describes the basic designing and construction practices required to build structures such as roads, dams, utility networks, buildings, towers, and tunnels.

1. **Safety** — demonstrates safety practices.

2. **Design** — applies principles of design to products.

3. **Planning** — solves planning and design problems by identifying, analyzing, sketching, evaluating, trying possible solutions, and making preferred designs.

4. **Processes** — identifies expertise needed to use tools, equipment, and machines.

5. **Conservation** — recycling materials or utilizing by-products to show that economic growth must be restrained if natural resources are to be conserved.

6. **Individual Craftsmanship** — demonstrates competency in building projects.

7. **Manufacturing** — applies basic concepts of management, personnel, and production techniques for creating a mass production project in the laboratory.

8. **Construction** — applies the basic knowledge and skill of the construction industry.

9. **Human Relations** — volunteers services to the school and community.

10. **Human Engineering** — applies human engineering principles to projects.

11. **Material Science** — demonstrates how materials and products are tested for various specific criteria.

12. **Marketing & Distribution** — to propose a plan to market and distribute a product.

13. **Electricity & Electronics** — explains the electronic theories involved in the operation of simple electrical devices.

14. **Transportation** — describes the impact of transportation on society.

15. **Maintenance and Service** — demonstrates competent skills in repairing products.

MECHANICAL DRAWING LABORATORY INSTRUCTIONAL OBJECTIVES FOR HIGH SCHOOL GRADES (9-12)

Technical Graphics

1. **Graphic Description** — describes the method by which a product is graphically displayed.

2. **Orthographic Projection** — describes and applies basic theories related to orthographic projection.

3. **Pictorial Drawings** — describes and applies basic theories related to pictorial drawings.

4. **Working Drawings** — objects and structures are represented through accepted working drawing standards.

5. **Graphical Solutions** — describes the methods by which problems are solved graphically.

6. **Production Planning** — develops plans to produce a product using orthographic and pictorial techniques.

7. **Guidance Information** — identifies careers relating to industrial design.

Instructional Objectives for Architectural Design

1. **Identification of Needs** — describes the criteria and method by which the activities of people determine the types of rooms or spaces selected in planning new structures.

2. **Equipment Utilization** — collects statistical data on various household equipment before establishing the size and shape of rooms or areas.

3. **Space Requirements** — establish space sizes for equipment and activities, and make sketches and drawings of space plans that will accommodate activities and equipment.

4. **Space Differentiation** — proposes various floor plan designs from the data accumulated.

5. **Structural/Building Plans** — formulates drawing plans for floor plans, elevations, wall and floor sections, detail drawings, pictorials, and renderings.

6. **Planning Community Resources** — analyzes data from human resources in the community.

7. **Property and Real Estate** — evaluates and determines the values of structures and real estate.

8. **Guidance Information** — identifies careers relating to architectural drafting, construction, and real estate.

MECHANICAL DRAWING LABORATORY INSTRUCTIONAL OBJECTIVES FOR HIGH SCHOOL GRADES (9-12) CONT'D

Instructional Objectives for Industrial Design

1. **Market Research** — plan and conduct market research activities to establish consumer demand.

2. **Preliminary Design** — draws preliminary designs for proposed products.

3. **Production Methods and Drawings** — makes detailed working drawings of machine parts and prepares complete assembly drawings.

4. **Specification Writing** — writes specifications for detailed assembly drawings.

5. **Machine and Tool Design** — makes drawings and models of simple machines and tools.

6. **Production Plant Design** — prepares plant layouts for improved utilization, develops manufacturing flow charts, and designs jigs and fixtures for mass production.

7. **Drawing Reproduction** — prepares inked and pencil tracings to be copied with school or base reproduction machines.

8. **Advertising** — makes pictorial renderings for the purpose of advertising the structure or product.

9. **Guidance Information** — identifies careers relating to industrial design.

DS MANUAL 2600.2
REVISED OCTOBER 1978

Approved List of Essential Textbooks/Instructional Materials for Industrial Arts Grades 6-12

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DEPARTMENT OF DEFENSE
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EDS-50867

October 5, 1978

MEMORANDUM FOR Director of Dependents Schools, Atlantic
Director of Dependents Schools, Europe
Director of Dependents Schools, Pacific

SUBJECT: Essential Textbooks/Instructional Materials Listing for Industrial Arts

It is a pleasure to provide you with the attached Department of Defense Dependents Schools (DoDDS) List of the Approved Essential Textbooks/Instructional Materials in Industrial Arts for the indicated categories. Any future appropriated fund procurement of Industrial Arts Essential Textbooks/Instructional Materials for DoDDS must conform to this listing until officially revised.

As you know, texts and materials provided by publishers for this review process were studied extensively during school year 1977-1978 by formal review committees in each of the DoDDS regions. Those worldwide committees were composed of students, parents, and community representatives as well as professional educators. Detailed data, conforming to established criteria and generated by each of these committees, were reviewed in detail by the Industrial Arts Task Group in their meeting of June 19-23, 1978. Essential Textbooks/Instructional Materials judged most suitable for achieving the published DoDDS objectives within the DoDDS system have been included in the approved list.

Your support of the DoDDS Industrial Arts Essential Textbooks/Instructional Materials review is appreciated.

Anthony Cardinale

Anthony Cardinale
Director

SEP 2 1980

APPROVED LIST OF
DoDDS ESSENTIAL TEXTBOOKS/INSTRUCTIONAL MATERIALS FOR INDUSTRIAL ARTS, GRADES 6-12

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APPROVED LIST OF
DoDDS ESSENTIAL TEXTBOOKS/INSTRUCTIONAL MATERIALS FOR INDUSTRIAL ARTS, GRADES 6-8

Title of Program	Author	Publisher	Copyright Date
Survey of Industry: (Woodworking, Plastics, Power, Metals, General Industrial Arts, etc.)			
Modern General Shop	Boyd and Brown	Goodheart-Wilcox Co.	1975
General Shop Woodworking	Fryklund and La Berge	McKnight Publishing Co.	1972
Bench Woodwork	Feirer	Charles A. Bennett Co., Inc.	1978
Power Mechanics	Atteberry	Goodheart-Wilcox Co.	1978
Basic Industrial Arts Series: (Set of Eight Booklets, Teacher Guide) 1. Plastics 2. Power Mechanics 3. Graphic Arts 4. Photography 5. Electricity 6. Drafting 7. Metal Working 8. Woodworking	Miller	McKnight Publishing Co.	1978
Plastics	Cope	Goodheart-Wilcox Co.	1977
Survey of Construction:			
Exploring the Construction Industry	Betts, Fannin and Hauenstein	McKnight Publishing Co.	1976
The World of Construction	Lux and Ray	McKnight Publishing Co.	1970
Survey of Manufacturing:			
The World of Manufacturing	Lux and Ray	McKnight Publishing Co.	1971

APPROVED LIST OF
DoDDS ESSENTIAL TEXTBOOKS/INSTRUCTIONAL MATERIALS FOR INDUSTRIAL ARTS, GRADES 9-12

Title of Program	Author	Publisher	Copyright Date
Materials, Process and Products of Industry: (Woods, Metals, Plastics, etc.)			
Exploring Woodworking	Zimmerman	Goodheart-Wilcox Co.	1977
Exploring Metal Working	Walker	Goodheart-Wilcox Co.	1976
Modern Metal Working	Walker	Goodheart-Wilcox Co.	1976
Exploring the World of Plastics	Steele	McKnight Publishing Co.	1977
Applications of Industrial Methods: (Electricity, Carpentry, Welding, etc.)			
Welding Skills and Practice	Giachino and Weeks	American Technical Society	1976
General Industry	Lindbeck and Lathrop	Charles A. Bennett Co., Inc.	1977
Modern Carpentry	Wagner	Goodheart-Wilcox Co.	1976
Technical Electricity and Electronics	Buban/ Schmitt	McGraw-Hill International Book Co.	1977
Understanding Electricity and Electronics	Buban/ Schmitt	McGraw-Hill International Book Co.	1975

industrial Technology: (Graphic Arts, Research, Power, etc.)			
Modern Industry	Wagner	American Technical Society	1975
Graphic Arts	Carlsen	Charles A. Bennett Co., Inc.	1977
General Power Mechanics	Worthington, Margules, Anglin	McGraw-Hill International Book Co.	1976
Technical Graphics: (Mechanical Drawing Basic)			
Exploring Drafting	Walker	Goodheart-Wilcox Co.	1975
Mechanical Drawing	French, Svensen, Helsel, Urbanick	McGraw-Hill International Book Co.	1974
Architectural Design: (Architectural Drawing)			
Architect: Drafting and Design/Third Edition	Hepler and Wallach	McGraw-Hill International Book Co.	1977
General Architectural Drafting	Wyatt	Charles A. Bennett Co., Inc.	1976
Architecture, Residential Drawing and Design	Kicklighter	Goodheart-Wilcox Co.	1976
Industrial Design: (Mechanical Drawing Advanced)			
Engineering Drawing and Graphic Technology	French, et al.	McGraw-Hill International Book Co.	1972
Technical Drawing	Giesecke, Frederick, Mitchell, et al.	Collier Macmillan International Inc.	1974

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